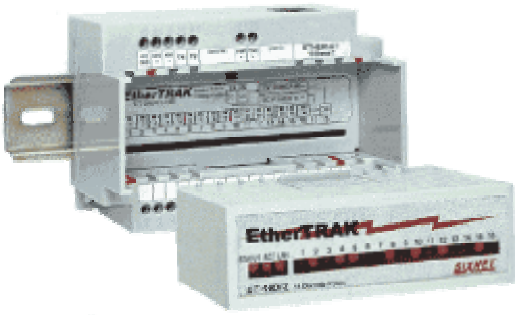
SIXNET® User Manual

EtherTRAK®

I/O Modules, I/O Expander and I/O Concentrator

Installation and Maintenance



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Applicable standards and certifications:

ISO 9001 — Total Quality

cULus LISTED — Hazardous Locations

cULus — Standard Locations

CE — European Directives

DNV — Marine & Offshore

FC — US Emissions

This manual applies to the following products:

All EtherTRAK I/O modules (ET-)
EtherTRAK I/O Expander (ET-GT-ST-1) – (Now obsolete – replaced by ET-GT-ST-2)
EtherTRAK I/O Concentrator (ET-GT-ST-2)

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SIXNET protects your investment in SIXNET systems with long-term planned technology and our unique Protected Technology Policy. We will continue to support the specified capabilities of standard SIXNET products for at least five years. We plan each product improvement and new feature to be upward compatible with existing designs and installations. Our goals are to make each new software release bring new power to your SIXNET systems and have every existing feature, applications program and data file continue to work.

We protect your investment even further with a liberal five-year trade-in policy. Exchange standard products for upgraded versions of the same product to take advantage of new features and performance improvements at any time for five years. A prorated trade-in allowance will be given for your existing equipment.

SIXNET protects your long-term productivity with state-of-the-art planned technology and continued support.

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These products must not be used to replace proper safety interlocking. No software based device (or other solid state device) should ever be designed to be responsible for the maintenance of consequential equipment or personnel safety. In particular, SIXNET disclaims any responsibility for damages, either direct or consequential, that result from the use of this equipment in any application.

Note: All information in this document applies to EtherTRAK I/O modules, I/O Expander, and I/O Concentrator; except where otherwise noted. Refer to the SIXNET I/O Tool Kit software online help systems for detailed product specifications and configuration settings.

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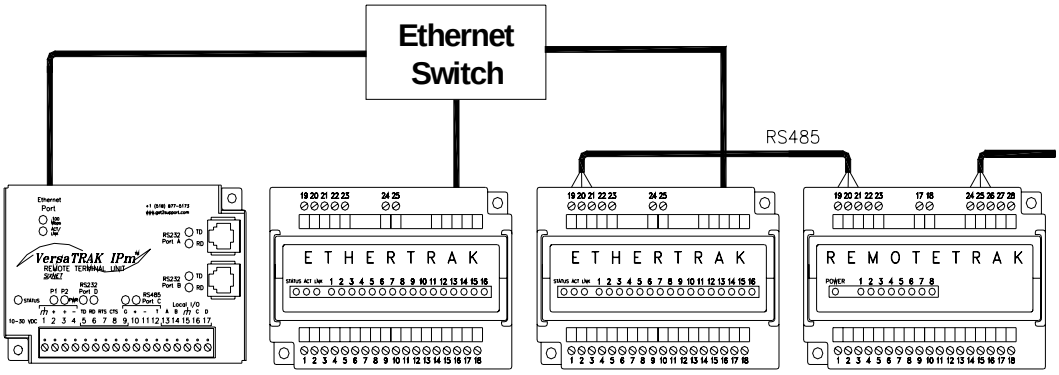
Section 1

Overview

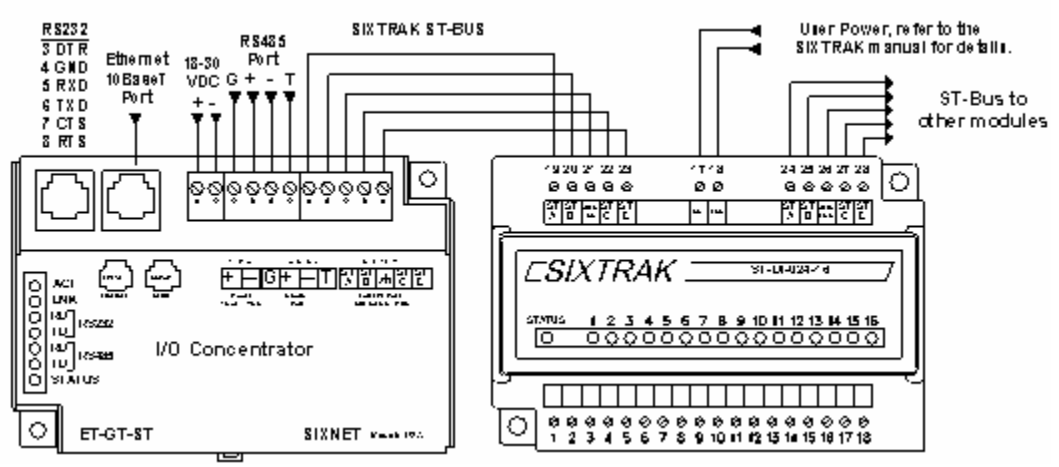
General Information

This manual will help you install and maintain the EtherTRAK I/O modules, I/O Expander, and I/O Concentrator. In summary, wiring for power, communications and I/O is connected to each module's base. Then, setup choices are entered using the SIXNET I/O Tool Kit software and the system will be ready to run. Shown below are some typical system configurations.

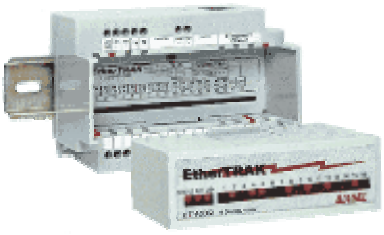


Distribute EtherTRAK I/O modules off of SIXNET Open RTUs and DCS Controllers

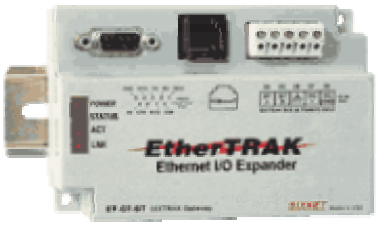
Using EtherTRAK I/O as Expansion I/O for a VersaTRAK RTU



Using an EtherTRAK I/O Concentrator for Larger Stations



EtherTRAK I/O Modules
ET-####-#



EtherTRAK I/O Expander
ET-GT-ST-1 (now obsolete)

EtherTRAK I/O Concentrator
ET-GT-ST-2

SIXNET Products Covered by this Manual

General Specification

These general specifications apply to all EtherTRAK I/O modules. More detailed product specifications may be found in the online help system of the SIXNET I/O Toolkit configuration utility.

Required Power	10-30 VDC (I/O modules); 18-30 VDC (I/O Expander/Concentrator with SixTRAK modules); 10-30 VDC (I/O Expander/Concentrator without any SixTRAK modules connected)
RS485 Expansion	Connect up to 32 RemoteTRAK modules or Modbus devices
Ethernet port	10BaseT (10 Mbps); RJ45
Ethernet Isolation	1200 Volts RMS (for 1 minute)
Operating Temp.	-30 to 70 °C (storage: -40 to 85 °C)
Humidity	5 to 95% (non-condensing)
Protocols	Modbus/TCP, Modbus/UDP, & SIXNET Universal

Note: EtherTRAK I/O modules can act as Ethernet to RS485 converters and passthru Modbus or SIXNET messages from Ethernet to RS485. They do not convert protocols. If a module's serial port is configured for Modbus Passthru mode then you must communicate to the gateway over Ethernet with Modbus/TCP or Modbus/UDP. If the module's serial port is configured for SIXNET Passthru mode then you must communicate to the gateway over Ethernet with the SIXNET protocol.

SIXNET Software Tools

SIXNET supplies the "mission oriented" tools you need for every step of your project from the initial specification, through startup, and years of trouble free operation. Configuration information flows between SIXNET Windows, saving you time (you don't have to enter data multiple times) and dramatically reducing data entry errors. Refer to the on-line help in the SIXNET I/O Tool Kit for complete details.

SIXNET I/O Tool Kit

The SIXNET I/O Tool Kit is a configuration, calibration and maintenance tool for SIXNET hardware. Use the I/O Tool Kit to configure I/O features, perform channel-by-channel calibrations in meaningful engineering units, and perform live diagnostics at each station. Refer to the electronic help for details.

OPC or DDE

Kepware or other commercial I/O driver packages that support Sixnet or Modbus protocol generally provide access to I/O for Windows applications via OPC and/ or DDE.

OPC (OLE for Process Control) and DDE (Dynamic Data Exchange) are protocols used for communication between Windows programs. An OPC / DDE server allows any Windows application with an OPC / DDE client to access SIXNET I/O registers directly.

There are two Kepware servers on the SIXNET CD: KepServer and KepServerEx. The Kepware servers allow any Windows application with an OPC or DDE client to access SIXNET I/O over Ethernet or serial ports. When an OPC command is received, the KepServer sends the appropriate Modbus RTU protocol command over a serial port or Ethernet to the remote station or module. The KepServerEx functions in the same manner, but it sends SIXNET Universal protocol instead of Modbus RTU protocol. The I/O registers are referenced by the tagnames assigned using the SIXNET I/O Tool Kit.

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Getting Started with SIXNET Hardware

Following these steps will make installation and start-up easier.

(Also see Section 5 for more details.)

❶ Mount the Hardware

If you purchased a TrakPak packaged system, the complete enclosure is ready for installation on any flat surface. If you purchased individual components, refer to the following sections of this or the appropriate user manuals for information on installing them into an enclosure.

❷ Install ST-BUS or Communication Wiring to I/O Modules

Make ST-BUS wiring connections to any SixTRAK I/O modules. Refer to a following section for ST-BUS wiring guidelines. Make the necessary communication connections to any EtherTRAK or RemoteTRAK I/O modules. If you have a TrakPak packaged system, all these connections have already been done for you.

❸ Connect Power and I/O Wiring to the Modules

Connect AC power to the SIXNET or user supplied power supply. Make DC power connections from the power supply to the SIXNET components. Make field wiring connections to the SIXNET I/O modules and any peripheral equipment. Refer to the appropriate user manuals for I/O connection details.

❹ Install Communication Cabling

Install the appropriate Ethernet, RS232, and/or RS485 cabling between the SIXNET equipment and to your PC.

Fabricate and install RS232 and RS485 cables as needed to connect to other devices. If you are using Ethernet units, install the correct cabling and peripherals. Refer to the documentation for your Ethernet communication devices for details.

❺ Apply Power

Power up the SIXNET components and related peripherals. Observe the status LED on each unit. Typically a solid ON indicates proper operation. A blinking LED may indicate that the unit needs to be configured. Refer to the appropriate SIXNET user manual for details.

❻ Configure Using the SIXNET I/O Tool Kit

Refer to the steps on the next page to create a hardware configuration for each **SIXNET** station. Refer to the on-line help in the I/O Tool Kit for details.

❼ Test the Hardware

Use the Test I/O window in the I/O Tool Kit program to verify proper I/O operation of all **SIXNET** stations. Refer to the I/O Tool Kit on-line help system.

❽ Configure Your PC Software to Communicate with the SIXNET station(s)

Refer to the documentation for your software.

❾ If You Have Difficulty

If you experience startup trouble, refer to a following page in this document for some troubleshooting tips or go to www.get2support.com. If you still need assistance then please contact SIXNET.

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Using SIXNET Windows Software

Below is a quick overview of using the SIXNET I/O Tool Kit. It is supplied on the SIXNET CD and registering for Level 1 (basic features) is free.

Note: An expanded version of this page has been provided as on-line help. To access it, click on the Getting Started icon in the I/O Tool Kit online help.

Basic Configuration: Run the SIXNET I/O Tool Kit program and create your panel layouts. Then configure operating parameters for each SIXNET component, including channel tag names. Link the SixTRAK I/O modules (if any) and load your configuration to the controller or RTU. Assign virtual I/O modules and I/O transfers for any EtherTRAK or RemoteTRAK modules you wish to have the controller or RTU poll. Save this information to a project file. Using the Test I/O function, verify that you can read and write all your I/O.

Note: Set tag name restrictions in the SIXNET I/O Tool Kit program before creating tag names to ensure compatibility when exporting them for usage in other Windows applications.

Your SIXNET components are now ready to run. If you will be running a Windows application that requires an I/O driver such as Control Room, then continue with the following steps.

Exporting I/O Definitions: (optional) Some Windows applications, such as ISaGRAF, Citect, Kepserver, KepserverEX and Intellution FIX, can import SIXNET tag names. If your Windows application supports this feature, run the SIXNET I/O Tool Kit and open your project file. Export your tag names to a file using the appropriate format by choosing 'File→ Export I/O Definitions'.

Note: If you are exporting tag names for ISaGRAF, Citect, or Intellution, you must create, or already have, a project to export tag data into.

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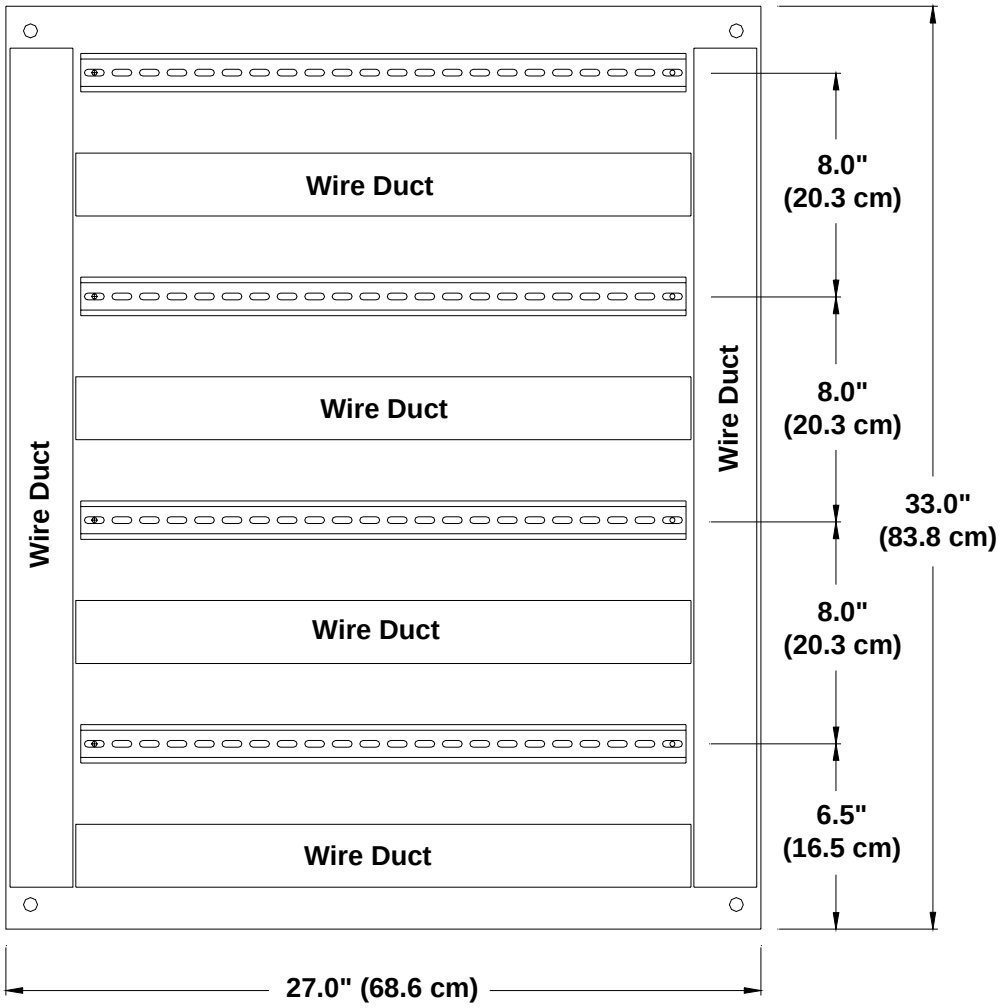
Section 2 Assembly and Installation

Panel Assembly

Most SIXNET components snap onto DIN rail strips fastened to a subpanel. Figure 2-1 shows a sample panel with DIN rail strips and wire duct attached. Recommended DIN rail spacing is 8 inches. This spacing allows room for wire duct to be installed without obstructing field wiring installation.

The SIXNET components are typically installed against one another, but space may be left between modules to accommodate other DIN rail mounted components such as terminal blocks and fuse holders. End clamps are recommended to restrict side-to-side movement. Figure 2-2 shows the physical dimensions for most of the units covered by this manual (except for the ET-MIX24880). See Figure 2-3 for the physical dimensions of the ET-MIX24480 instead.

SIXNET components can be installed in any orientation and order on your panel.



Sample Layout For a 36” x 30” Enclosure (Figure 2-1)

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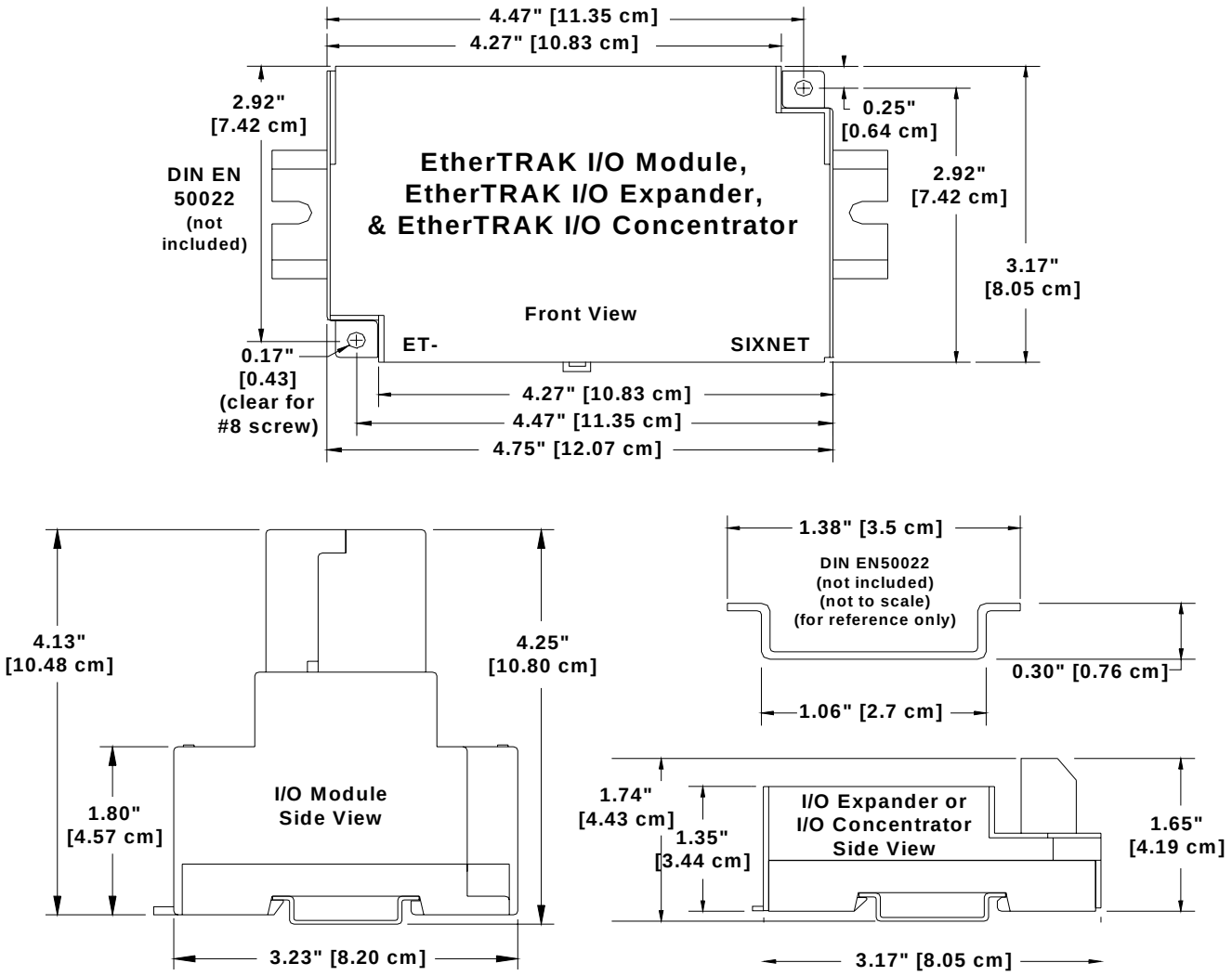
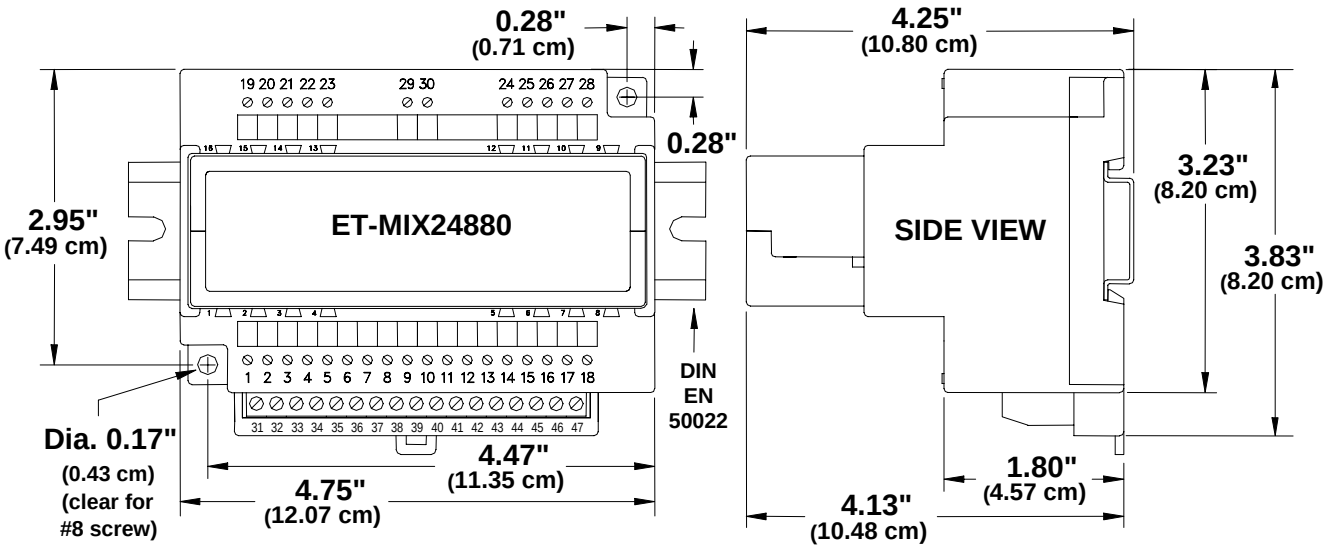


EtherTRAK Dimensions
(Figure 2-2)



ET-MIX24880 Dimensions
(Figure 2-3)

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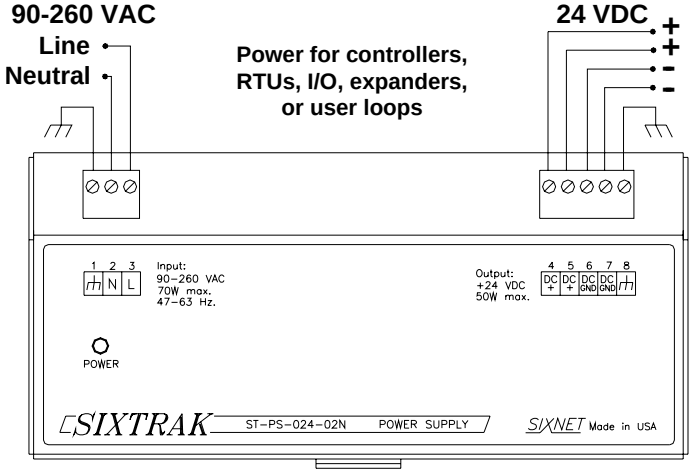
Section 3 Power and ST-BUS Wiring

Power Requirements

EtherTRAK units accept 24 VDC power from a SIXNET power supply (ST-PS-024-02N or RM-PS-024-01F) or from a user DC power source of 10 to 30 VDC (I/O modules) or 18 to 30 VDC (I/O Expander and I/O Concentrator).

ST-PS-024-02N (24VDC @ 2A)

The SixTRAK power supply operates on 90 to 260VAC (47 to 63 Hz.). Refer to Figure 3-1 for connections. Tighten these screw terminals to a maximum of 3.48 in-lbs.

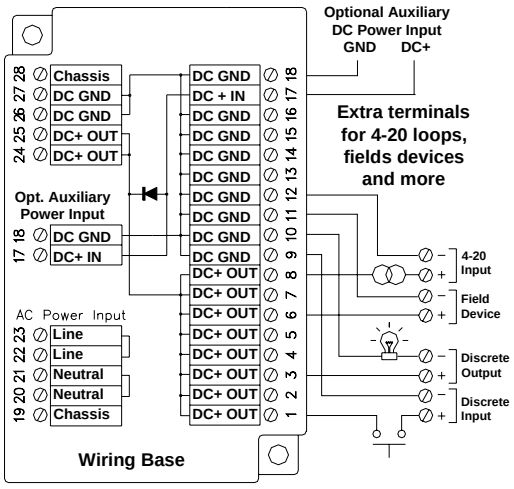


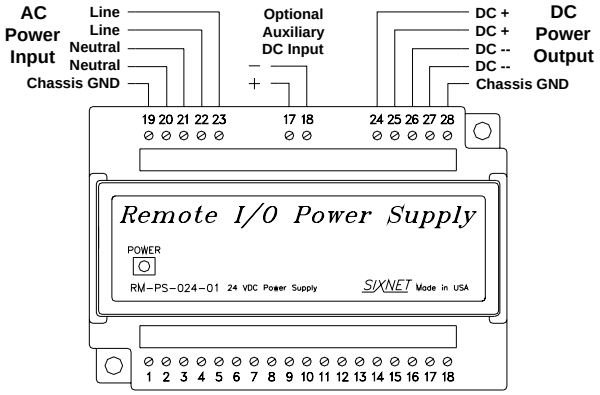
ST-PS-024-02N Power Connections

(Figure 3-1)

RM-PS-024-01F (24VDC @ 1A)

The RM-PS-024-01F operates on 85-264 VAC (47-63 Hz) or 120-370 VDC. Refer to Figure 3-2 for connections. Tighten the screw terminals to a maximum of 3.48 in-lbs.




AC Power Input
Line
Line
Neutral
Neutral
Chassis GND
Optional Auxiliary DC Input
DC + DC + DC -- DC --
Chassis GND
DC Power Output
19 20 21 22 23
17 18
24 25 26 27 28
Remote I/O Power Supply
POWER
RM-PS-024-01 24 VDC Power Supply
SIXNET Made in USA
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
DC Power for controllers, RTUs, I/O, and user loops

RM-PS-024-01F Power Connections

(Figure 3-2)

RM-PS-024-01F Redundant Power

The RM-PS-024-01F allows you to connect auxiliary 24 VDC power (from another RM-PS-024-01F or other source) to terminals 17 and 18. When auxiliary power is connected, the RM-PS-024-01F will source most of the power, under normal operating conditions. If the primary power fails then the auxiliary power will immediately take over.

EtherTRAK DC Power Wiring

All SIXNET units and user instrumentation loops may be powered from a single DC source. Refer to Figure 3-3 and 3-4 for typical DC power connections. The user DC power source must be between **10 to 30 VDC** (EtherTRAK I/O Modules) or **18 to 30 VDC** (EtherTRAK I/O Expander, EtherTRAK I/O Concentrator, and SixTRAK I/O Modules).

Current Requirements

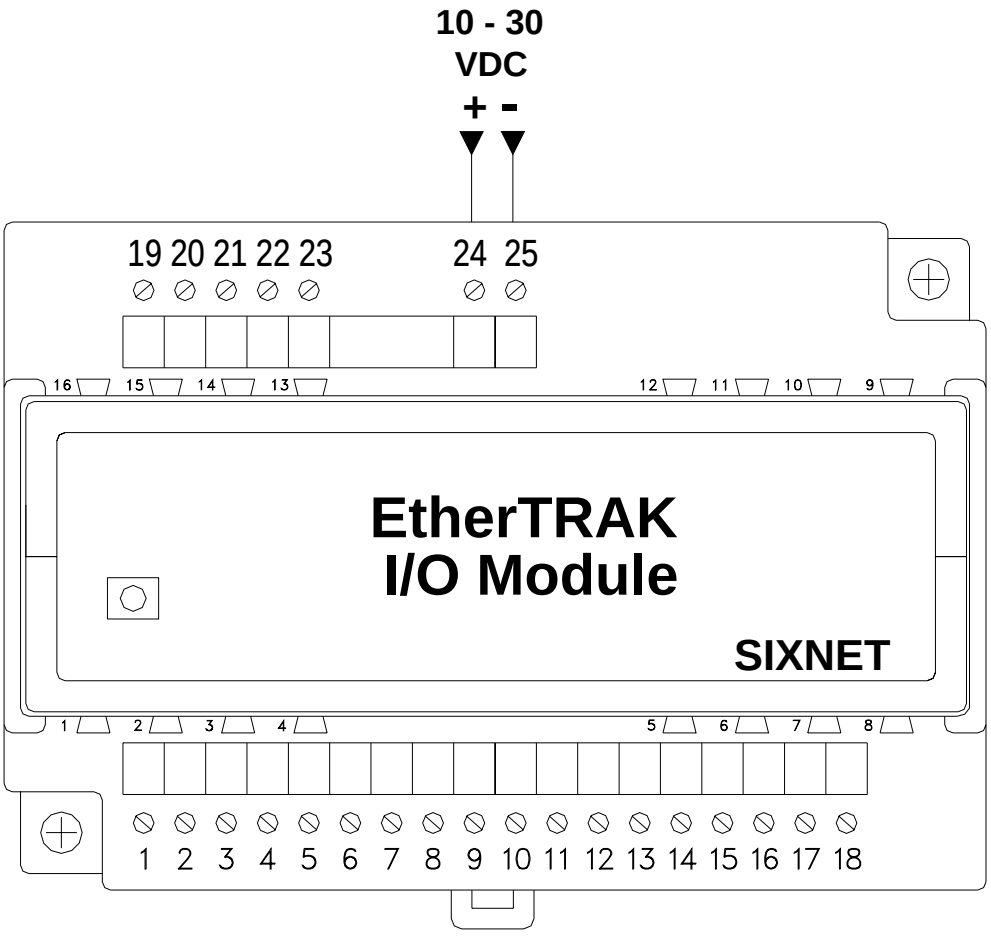
To calculate the current requirements, add the wattage required for the SIXNET units in use. Then divide the total wattage by the DC power source voltage. Then add any current needed for user instrumentation loops.

ST-Bus Wiring Guidelines

ST-Bus wiring connects the SixTRAK I/O modules to the EtherTRAK I/O Expander or I/O Concentrator. Refer to the SixTRAK I/O User Manual for complete ST-Bus wiring guidelines and instructions.

ST-Bus Capability

Max. modules interfaced by one Expander or Concentrator 20
Required cable type ..... Any with 2 individually shielded pairs, 22AWG min.
Recommended cables ..... Alpha 2466C, Belden 8723, Carol C1352
Max. cabling off each Expander or Concentrator .....50 ft. (16M)



EtherTRAK I/O Module Power Connections (Figure 3-3)

Screw Torque

All the screw terminals on the base should be tightened to a maximum of 3.48 in-lbs.

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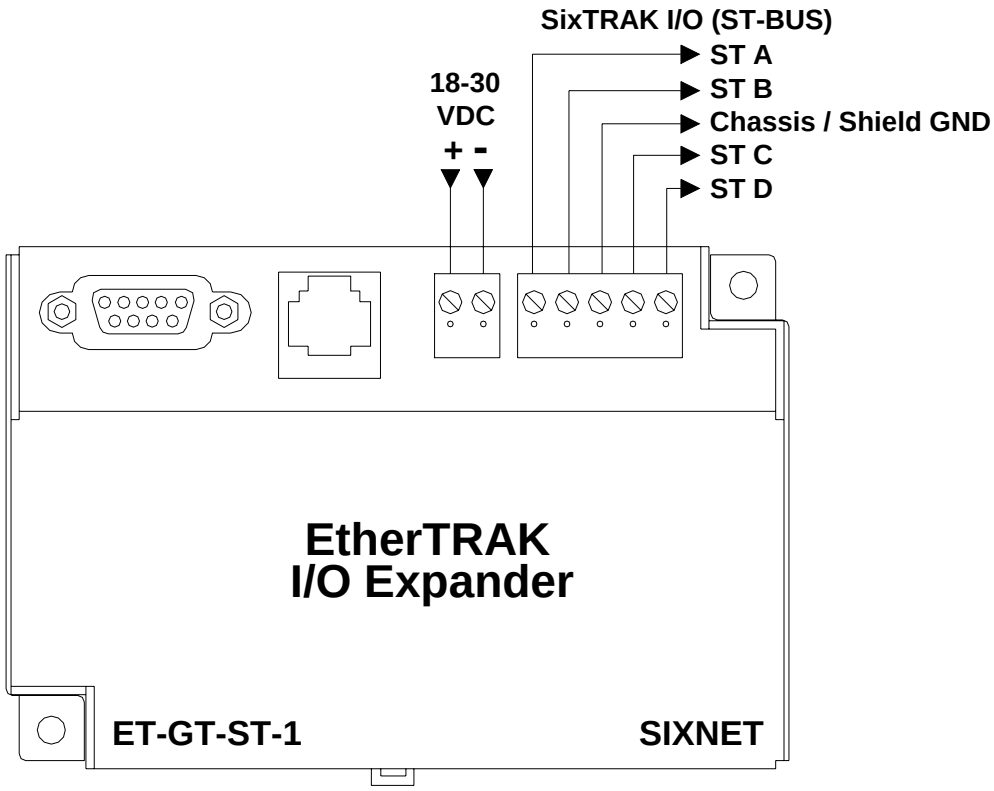
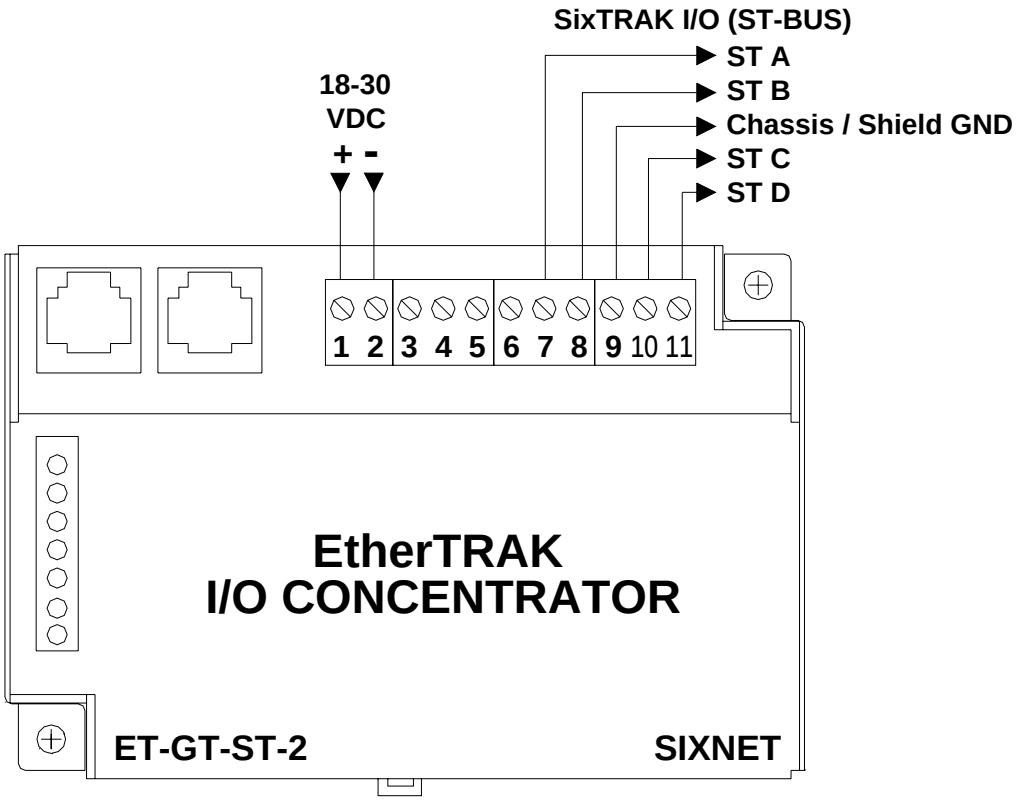


EtherTRAK I/O Expander Power Connections (Figure 3-4)



EtherTRAK I/O Concentrator Power Connections (Figure 3-4)

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Section 4 Communications

Communication Ports

The EtherTRAK I/O Modules, I/O Expander, and I/O Concentrator have the following communication ports and connectors.

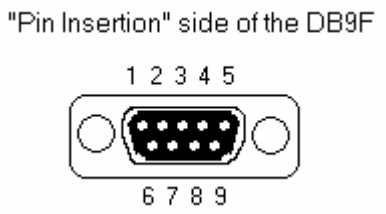
EtherTRAK Product	Ethernet Port Style	RS232 Port Style	RS485 Port Style	SixTRAK ST-BUS
I/O Module	RJ45	-	Screws	-
I/O Expander	RJ45	DB9 Male	-	Screws
I/O Concentrator	RJ45	RJ45	Screws	Screws

RS232 Port Overview

The I/O Expander and I/O Concentrator each have an RS232 port for configuration, diagnostics, or interfacing to other equipment. Please note that the connectors are different between the two units but otherwise the ports function identically. See figures 4-2 and 4-3 for the pin-outs of these ports.

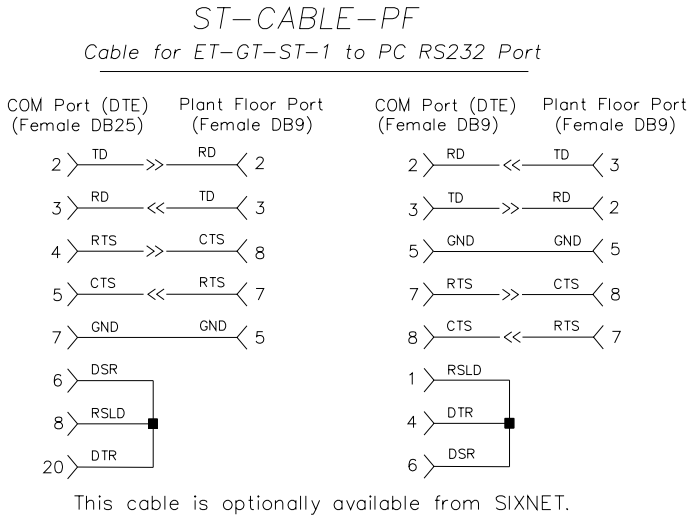
"Plant Floor" RS232 Port (Ethernet I/O Expander)

Use a ST-CABLE-PF (not included) to interface the RS232 DB9 port on the EtherTRAK I/O Expander to a DB9 com port of your PC. Use a RJ45 to DB9 cable (or RJ45 patch cable with a RJ45 female to DB9 female adapter) to interface the RS232 RJ45 port on the EtherTRAK I/O Concentrator to a DB9 com port of your PC. Refer to the SIXNET Electronic catalog for more information on connecting to other equipment.



DB9F Pin Locations
(for RS232 connection to a PC)

Gateway (DTE) RS232 Port	
Pin	Signal
1	DCD out
2	TD out
3	RD in
4	DTR out
5	Sig GND
6	N/C
7	RTS out
8	CTS in
9	N/C


ST-CABLE-PF
Cable for ET-GT-ST-1 to PC RS232 Port
COM Port (DTE) (Female DB25)
Plant Floor Port (Female DB9)
2 TD >> RD 2
3 RD << TD 3
4 RTS >> CTS 8
5 CTS << RTS 7
7 GND GND 5
6 DSR
8 RSLD
20 DTR
COM Port (DTE) (Female DB9)
Plant Floor Port (Female DB9)
2 RD << TD 3
3 TD >> RD 2
5 GND GND 5
7 RTS >> CTS 8
8 CTS << RTS 7
1 RSLD
4 DTR
6 DSR
This cable is optionally available from SIXNET.

EtherTRAK I/O Expander RS232 (DB9) Pin-out & ST-CABLE-PF (optional accessory) Wiring

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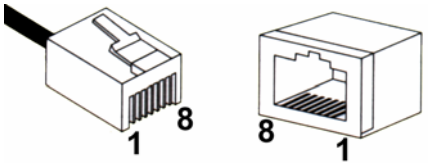
RJ45 RS232 Port (Ethernet I/O Concentrator)

For PC connections there are two choices:

1. Connect a straight-through Ethernet cable between the SIXNET RJ45 port and the prewired RJ45 to DB9 female adapter (part number: RJ45-DB9F-IPM).
2. Insert the colored wires of the unwired RJ45 to DB9 **female** adapter into the appropriate sockets of the DB9 female connector according to the second table below. Plug the adapter's female DB9 connector onto your PC.

The RJ45 serial port connector bodies on SIXNET products are metallic and are connected to the Chassis GND terminal. Therefore, shielded cables may be used to provide further protection. To prevent ground loops, the cable shield should be tied to the metal connector body at one end of the cable only.

Note: The SIXNET RJ45 port pinouts are EIA/TIA-561 compliant.



RJ45 Pin Locations (for RS232 or Ethernet)

Typical PC Adapter Wiring:

RJ45F to DB9F RJ45F Pin #, Signal Name	Adapter wire color	DB9 Female Connector Pin #, Signal Name
1 RI/DSR in	Blue	4 DTR out
2 DCD in	Orange	N/C
3 DTR out	Black	6 DSR in
4 GND	Red	5 GND
5 RXD in	Green	3 TXD out
6 TXD out	Yellow	2 RXD in
7 CTS in	Brown	7 RTS out
8 RTS out	White	8 CTS in

Ethernet Port

A 10BaseT Ethernet port is found on all units. A standard RJ45 connector is provided. See figures 4-1 thru 4-3 for the pin-outs. This port has a fixed unique MAC address. The IP address can be set with the SIXNET I/O Tool Kit software. Refer to the on-line help for details.

Use data-quality (not voice-quality) twisted pair cable rated category 5 with standard RJ45 connectors. For best performance use shielded cable. Please note that these cables are available as straight-thru or cross-over wired. The following is a guide for when to use each type:

EtherTRAK Ethernet Port to	Cable Type to Use
PC card	Cross-over
Other Ethernet I/O	Cross-over
PLC (typical)	Cross-over
Other Ethernet enabled devices	Cross-over
Port (other than uplink) on switch or hub	Straight-thru

RS485 Port

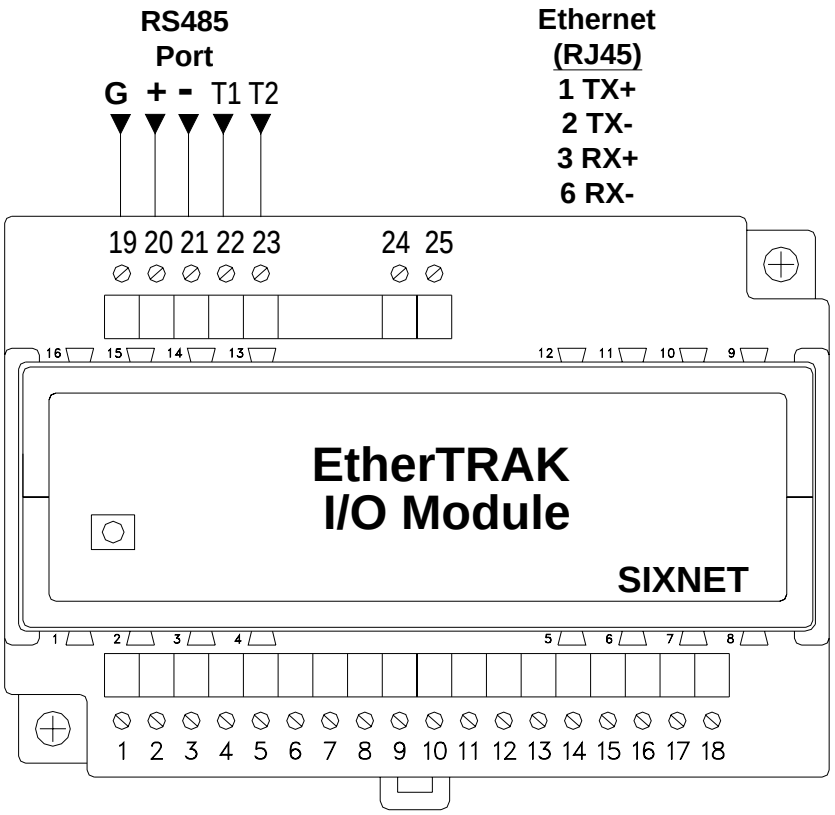
This port is found on all EtherTRAK I/O Modules and the EtherTRAK I/O Concentrator. It provides a RS485 (2-wire, half duplex only) connection to SIXNET's RemoteTRAK I/O modules or other equipment. On EtherTRAK I/O modules, four terminals (for signal ground, 485+, 485-, & termination) are provided. On the EtherTRAK I/O Concentrator, five terminals (for signal ground, 485+, 485-, termination 1, & termination 2) are provided. Generally, you connect + to + and – to – between units. However, since there is no standard for RS485 terminal designations you may need to connect + to – and – to + in some cases. No damage will result if you connect incorrectly. It is highly recommended that you tie the signal ground to an appropriate ground (if available) between all RS485 units. Make sure to use a good quality communication cable with three conductors (twisted is preferred) plus a shield. To prevent ground loops, the shield should be connected to chassis ground on only one end of any cable run.

> **Note:** If you have existing wiring that has only two conductors and a shield, you can use the shield to connect the signal grounds between stations. This is not optimal (especially for long cable runs) but should work in most situations.

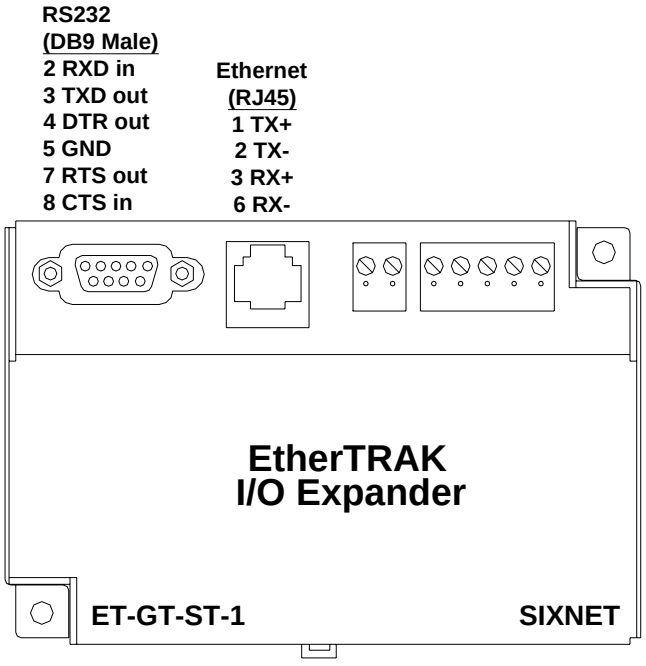
RS485 Termination: All these units have RS485 termination components (150 ohm resistor and a 0.1 µF capacitor connected in series) already inside. To terminate your RS485 network on an EtherTRAK I/O Module just jumper the "T1" terminal to the "T2" terminal. To terminate your RS485 network on an EtherTRAK I/O Concentrator just tie the "T" terminal to the RS485 minus (–) terminal. Make sure to use the same type and size conductor as already used for your RS485 minus (–) connection. It is recommended that both end stations of your RS485 network be terminated. Avoid terminating more than two stations. Refer to the RemoteTRAK I/O User Manual on how to terminate a RemoteTRAK I/O Module. For 3rd party devices, please refer to their user manual for termination instructions.

Bias Resistors: On a RS485 2-wire network, a pair of bias resistors (1K ohm typically) acting upon the transmit/receive wires may be required. If bias resistors are not present, the receive inputs on some RS485 devices may react to noise on the floating wires. The bias resistors will force the transmit/receive wires to a known (non-floating) state when none of the RS485 devices are transmitting data. Some RS485 devices have bias resistors built-in, and are enabled through DIP-switch or jumper settings. Make sure there is only one pair of bias resistors acting upon the network.

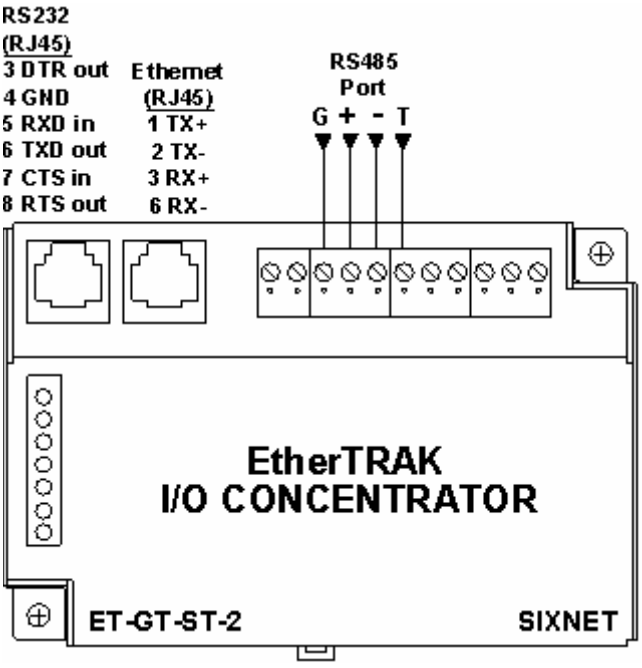
> **Note:** If your RS485 network is made up exclusively of SIXNET devices then these bias resistors are not necessary.



EtherTRAK I/O Module COM Connections
(Figure 4-1)



EtherTRAK I/O Expander COM Connections
(Figure 4-2)



EtherTRAK I/O Concentrator COM Connections
(Figure 4-3)

Section 5 Configuring EtherTRAK I/O

RM-232-SETUP Remote I/O Setup Module (Optional)

Operation

This setup tool is recommended to initially configure each EtherTRAK and/or RemoteTRAK I/O module. To use the setup module, simply unplug any EtherTRAK or RemoteTRAK module from its base and insert the setup module into the base.

Note: EtherTRAK and RemoteTRAK "smart bases" allow hot swap of live modules -- an exclusive SIXNET feature that makes it permissible to configure EtherTRAK and RemoteTRAK modules in live systems.

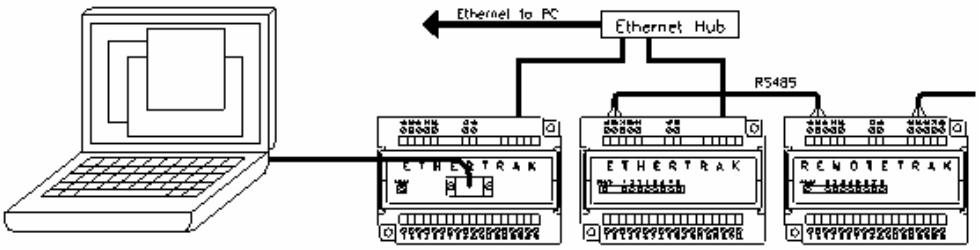
The EtherTRAK or RemoteTRAK module configuration you created the SIXNET I/O Tool Kit program will be written into permanent memory in the module's base. When the EtherTRAK or RemoteTRAK module is reinserted into its base, the module will find and upload the configuration information, instantly configure itself and begin scanning I/O. Once an EtherTRAK or RemoteTRAK module has been configured with an appropriate station address and IP address (EtherTRAK only), modified configuration data can be downloaded through the Ethernet port or RS485 port into the module base. More information on the Remote I/O Setup Module can be found in the online help system of the SIXNET I/O Toolkit.

RS232 Wiring

Connect the setup module to your PC using a standard SIXNET ST-CABLE-PF RS232 cable. Only the transmit (TD), receive (RD) and common return (GND) signals are actively used. The RS232 port on this configuration tool is electrically isolated to protect your computer in the event of field wiring errors. The setup module runs on the DC power connected to terminals 17 and 18 of the base it is plugged into. No other connections are required. (I/O wiring can be left undisturbed.)

RS232 Mode Selection

This module always communicates to the host PC at 9600 baud, with no parity and eight data bits. Be sure to select "Use Setup Module's Settings" as the communication device selection in the SIXNET I/O Tool Kit program.



SIXNET I/O Tool Kit

EtherTRAK units are configured using the SIXNET I/O Tool Kit software. Configuration parameters are written over Ethernet, RS485 or RS232 (setup module only) into permanent memory in the module's base. Refer to the SIXNET I/O Tool Kit help for details. The basic steps are:

1. Connect DC power to the module.
2. Connect an Ethernet cable to the module. Use a straight-through cable if you are connecting to an Ethernet hub or switch. Use a cross-wired cable if you are connecting directly to a PC. Make sure the LNK LED on the module / gateway is on solid (not blinking).
3. Run the SIXNET I/O Tool Kit and define the parameters for the unit. Be sure to:
   - Choose an IP address that is appropriate for your network. See the help file for details.
   - Enter in the serial number that is printed on a label on the module.
   - Choose a station (slave) number for the module that is unique.
   - Select the appropriate RS232 or RS485 com parameters (protocol, baud rate, etc.) to match

any device that you are going to interface to.

4. Once you've completed the wizard, save your project file. Go to the Device menu and choose Ethernet for the communication device. Then go to the Operations menu and select Load. This should set the IP address in the module and then load down your other parameters. If this load fails for some reason, here are some items to check:

   - Make sure the LNK LED is on solid. If it is off or blinking then a typical cause is a bad cable, an incorrect cable, or you are plugged into the wrong port on your hub/switch.
   - Try to "ping" the unit. Ping is a utility that comes with your PC. Start an MSDOS prompt and type "ping" followed by the IP address of the unit and then hit <CR>. For example, "ping 10.1.0.1" (do not type the quotes). If you get an "unknown command" error then you will need to install the TCP/IP Ethernet protocol on your computer. If you get "destination unreachable" then make sure the gateway's IP address is valid with respect to the IP address and subnet mask of your computer. If you get "request timeout" then check all the items above. For more info., refer to the SIXNET I/O Tool Kit help system.

5. Once you establish that you can communicate with the module from the SIXNET I/O Tool Kit you then should attempt to communicate with your device using your master software.

Note: For the EtherTRAK I/O Expander and I/O Concentrator you must load your configuration (with an appropriate IP address) initially through the RS232 port. This will set the IP address and then you can communicate to the unit via Ethernet.

Modes of Operation

The EtherTRAK I/O Modules, Expanders and Concentrators have the following modes of operation that can be configured with the SIXNET I/O Tool Kit software:

Slave Mode – In this mode the unit operates simply as a slave. It responds to read and write messages from a master PC, controller, RTU, or other device. EtherTRAK stations can respond to messages on all their ports at the same time allowing for multiple master interrogations. Each port can be set for a different protocol (SIXNET or Modbus). The Ethernet port (on all EtherTRAK units) is always a slave. The serial ports can be configured for slave, master, or passthru mode (depending on the unit). See below for the other modes.

Master Mode – The EtherTRAK I/O Expander and I/O Concentrator can act as a SIXNET or Modbus (ASCII or RTU) protocol master on either of their serial ports (RS232 or RS485). Just configure the port as a Modbus or SIXNET Master and then define I/O transfers to your slave stations. Refer to the I/O Tool Kit on-line help for details.

Master to Master Mode: This advanced mode allows two master devices to use the EtherTRAK I/O Expander or I/O Concentrator to exchange I/O data. In this mode the serial port is configured for Slave operation and must be connected to a Modbus or SIXNET master device. This device then can write/read I/O data to/from the internal registers of the gateway. Another master device can then do the same on the Ethernet side. With this scheme the two ports can be using different protocols. These EtherTRAK stations have thousands of I/O registers available for relaying data.

Passthru Mode – EtherTRAK I/O Modules can be configured for Passthru operation. When so, they must be connected to a Modbus or SIXNET slave device. The Ethernet port must be connected to a master device (via a switch or hub) such as a PC, PLC, or SIXNET controller/RTU. When the gateway receives a message on the Ethernet port from the master device it will look at the station number (Modbus slave ID) in the Modbus or SIXNET message (embedded in a TCP or UDP packet). If the number is 0 or matches it's own then it will respond directly to the message. If the number is anything else then it will pass the message out the serial port. Please note that the module does not convert protocols so if the incoming Ethernet message is SIXNET protocol then it will get sent out the serial port as SIXNET protocol. If the incoming Ethernet message is Modbus then it will get sent out as Modbus ASCII or Modbus RTU depending on how the serial port was configured. The module will then send any response it gets on the serial port out the Ethernet port to the IP address of the originator. It will then process the next Ethernet message in its buffer. Note: The EtherTRAK I/O Expander and Concentrator only support SIXNET protocol passthru.

EtherTRAK LEDs

Every EtherTRAK unit has a number of LEDs. These LEDs can be useful for system diagnostics. These LEDs can be observed in the following states:

I/O Module Status LED

On, with a quick "OFF" BLINK (1.9 seconds ON, .1 seconds OFF) - The module is configured and fully operational, but has not received a valid request from the host for a time longer than the specified time out period. A communication time out has occurred.

Full ON — The module is configured, fully operational, and has received communication from the host device before the timeout period expired. **This is the desired LED indication during system operation.**

Half BLINK — (1 second ON, 1 second OFF) - The module is not adequately configured and requires a download from the SIXNET I/O Tool Kit program.

Full OFF — There is no power to the module, or the status LED is being turned off intentionally by the SIXNET I/O Tool Kit during the module loading operation.

Quick ON BLINK — (1.9 seconds OFF, .1 seconds ON) - The module failed self-test at initialization. It will not attempt communication and should be replaced.

Expander or Concentrator Status LED

The "Status" LED on the I/O Expander and I/O Concentrator indicates its operational status:

Full ON — The gateway is operating properly. **This is the desired LED indication during system operation.**

Full OFF — There is no power to the unit or service is required. Contact SIXNET technical support.

FAST BLINK — This may occur when the units RS232 (Plant Floor) port is being reset or firmware is to be downloaded from the I/O Tool Kit software.

SLOW or PERODIC BLINK — This indicates that the internal watchdog has detected a problem. Try clearing the memory and reloading the project from the I/O Tool Kit.

Status LED Wink Feature

The "Status" LED of an EtherTRAK I/O module can be intentionally winked (10 blinks/ second) by the SIXNET I/O Tool Kit program to verify communications.

Expander or Concentrator TD / RD LEDs

The Receive Data (RD) LED will be ON when characters are being sent out the serial port.

The Transmit Data (TD) LED will be ON when characters are being received into the serial port.

ACT / LNK LEDs

The activity (ACT) LED on an EtherTRAK unit will flicker anytime there is traffic on the Ethernet network, regardless of whom the network messages are intended for. The link (LNK) LED will be ON whenever a valid link to another Ethernet device is detected.

Note: The best troubleshooting tools for EtherTRAK units are the Status, ACT, and LNK LEDs. Each EtherTRAK Status LED indicates the health of the unit and also the status of communication from the host device. You can use the Wink feature to provide continuous transmission to an EtherTRAK I/O module. Note that an EtherTRAK I/O module does not send a reply in response to a Wink command.

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Section 6 Discrete I/O Modules

ET-8DI2-8DO2-H **8 Discrete Inputs and 8 Discrete Outputs**
ET-16DI2-H **16 Discrete Inputs**

ET-8DI2-8DO2 Overview

This module provides one terminal for each input or output channel. All inputs may be wired as sourcing or sinking. Outputs are wired in a sourcing (power switching) configuration only. An input count feature uses analog input registers to accumulate the positive transitions of each input. More information can be found in the on-line help in the SIXNET I/O Tool Kit program.

Number of Channels	**8 discrete inputs, 8 discrete outputs (ET-8DI2-8DO2 only)**
Input Voltage Range	**12/24 VDC/VAC**
Input Current @ 24 VDC	**6.7 mA**
Output Voltage Range	**10 – 30 VDC**
Maximum Count Rate	**100 Hz (6000 / minute) each input, plus selectable 2KHz (120,000 / minute) mode for input 1 only**

Wiring and Jumpers

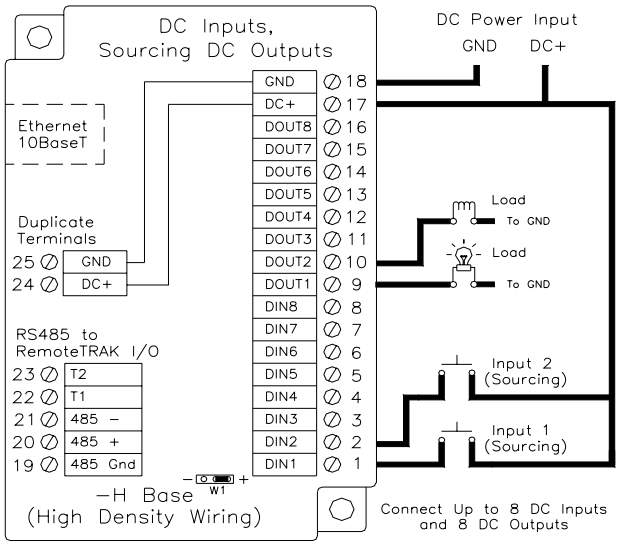
One wire from each sourcing field input should be bussed together and connected to terminal 17 (DC +). One wire from each sourcing field output and/or or sinking field input should be bussed together and connected to terminal 18 (DC GND). Refer to the wiring diagram below. Set jumper W1 to match the wiring configuration of the inputs.

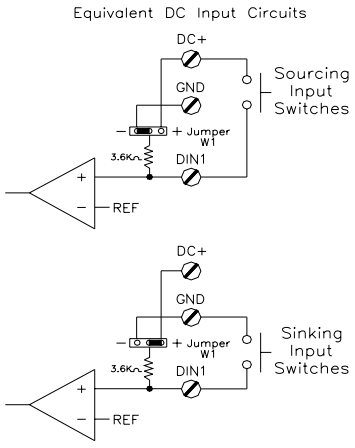
TPO Feature

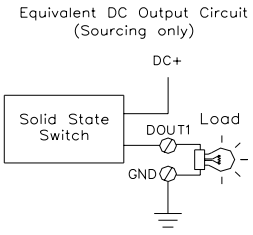
Time proportioned outputs pulse ON and OFF with a duty cycle proportional to an analog value stored in an analog output register. TPO outputs are a low cost way to get smooth proportional control of heaters and other process variables. Typically, TPO analog output registers are assigned to the output of PID or other control logic in an ISaGRAF or other program. Use the SIXNET I/O Tool Kit to set pulse cycling as fast as 10 mS or as slow (many minutes) as your system dynamics require. Each output may be configured as a TPO or ordinary discrete output.

I/O Registers

Function	SIXNET Registers	Modbus Registers
Discrete Inputs	X0 – X7	10001 – 10008
Discrete Outputs	Y0 – Y7	00001 – 00008
TPO Values	AY0 – AY7	40001 – 40008
Counter Inputs	AX0 – AX7	30001 – 30008







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ET-16DI2-H High Density Discrete Input Module

ET-16DI2 Overview

This module provides sixteen input channels. Inputs may be wired as all sourcing or sinking. An input count feature uses analog input registers to accumulate the positive transitions of each input. More information on this and other features can be found in the on-line help supplied with the SIXNET I/O Tool Kit program.

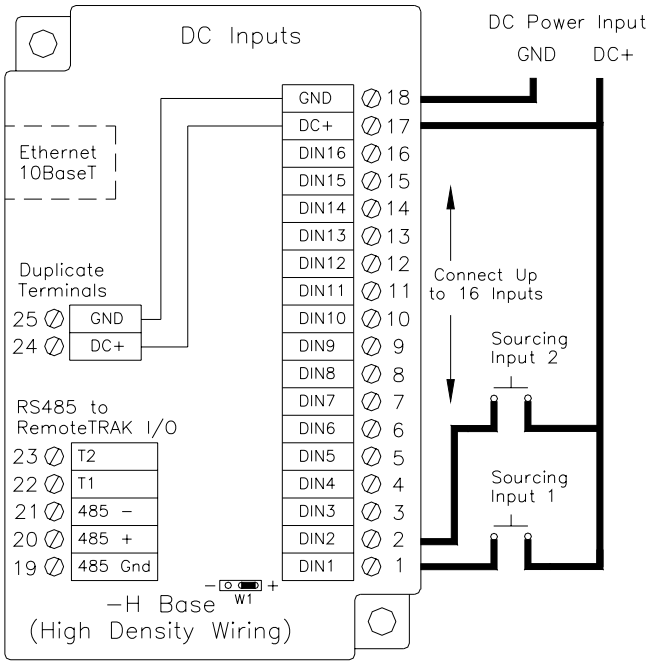
Number of Channels	**16 discrete inputs (connected to a common source)**
Input Voltage Range	**12/24 VDC/VAC**
Input Current @ 24 VDC	**6.7 mA**

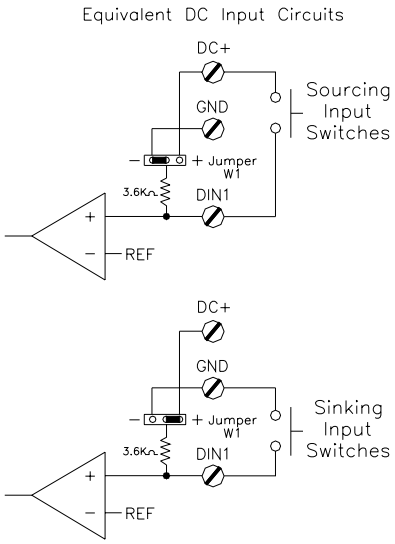
Wiring and Jumpers

Positive DC or AC voltage must be applied to an input to indicate an ON condition. All channels are referenced to a common return or supply, which is connected to the negative side (ground) or positive side (DC+) of the DC power source. One wire from each sourcing field input should be bussed together and connected to terminal 17 (DC +). One wire from each sinking field input should be bussed together and connected to terminal 18 (DC GND). Refer to the wiring diagram below. Set jumper W1 to match the wiring configuration of the inputs.

I/O Registers

Function	SIXNET Registers	Modbus Registers
Discrete Inputs	X0 – X15	10001 – 10016
Counter Inputs	AX0 – AX15	30001 – 30016





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ET-8CNT Overview

ET-8CNT High Speed Counter Module

This high-speed counter module has eight isolated circuits that accept pulse inputs from a variety of sources, including quadrature and incremental encoders. Count values are reported in 16 bit analog input registers or 32 bit long registers. The states of the counter inputs are also reported as discrete inputs. Pulse rates up to 50 kHz are supported. The counters can be reset by toggling discrete output bits. Counter modes are selected using the SIXNET I/O Tool Kit program. More information on this and other features can be found in the on-line help supplied with the SIXNET I/O Tool Kit program.

Number of Channels	**8 discrete inputs, isolated**
Input Voltage Range	**12/24 VDC/VAC**
Input Current @ 24 VDC	**6.7 mA**

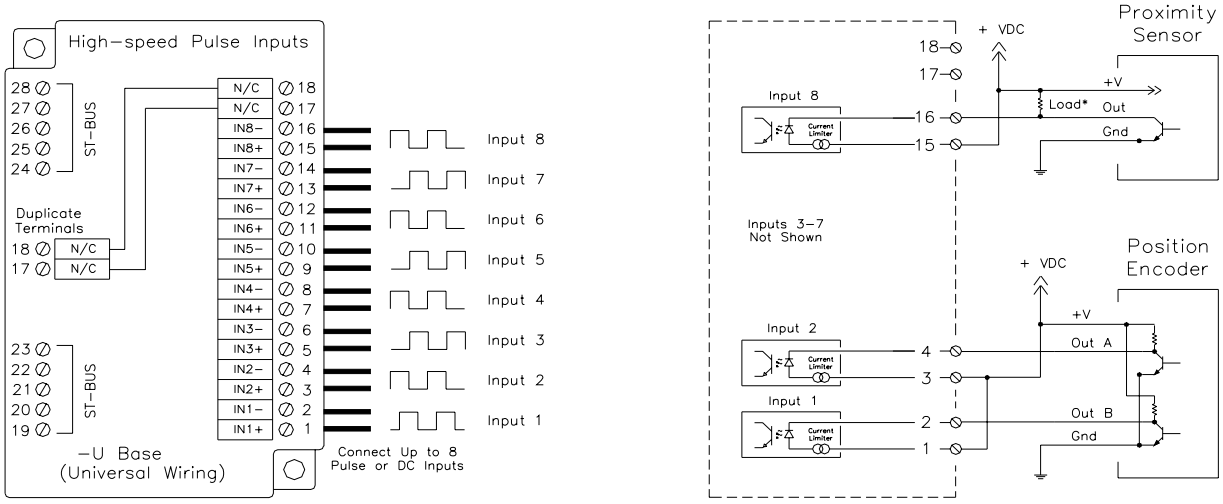
Input Wiring

Screw terminal assignments are shown below. For best noise immunity, connect input signals using twisted wire pairs. To maintain the best differential noise rejection, do not connect (-) screw terminals together at the I/O base. Positive DC voltage must be applied to an input to indicate an ON condition. Refer to the wiring diagram below.

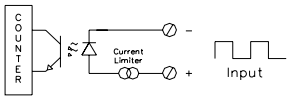
Any odd-numbered input can be gated by connecting a gating signal to the next highest even-numbered input. For example, Input 2 can gate the counter for Input 1.

I/O Registers

Function	SIXNET Registers	Modbus Registers
Discrete Inputs	X0 – X7	10001 – 10008
Counter Inputs	AX0 – AX7 or LI0 – LI7	30001 – 30008
		35001 – 35008
Resets	Y0 – Y7	00001 – 00008



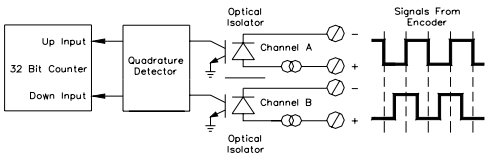
Typical Count/Rate Input Circuit



* Populate the appropriate load resistor, unless your sensor does not require one.

Typical Wiring Models

Typical Position Input Circuit



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Section 7 Discrete Output Modules

ET-16DO2-H High Density Discrete Output Module

Et-16DO2 Overview

Sixteen discrete output channels each provide up to 1 Amp DC to motor contactors, valves, and other loads. Inductive surge protection is provided. Each of the sixteen outputs may optionally be configured as Time Proportioned Outputs that pulse ON at a duty cycle proportional to an analog output register value. Typically these TPO outputs are controlled by a PID loop or other process algorithm in a control program. More information can be found in the on-line help supplied with the SIXNET I/O Tool Kit program.

Number of Channels	**16 discrete outputs connected to a common DC source**
Output Voltage Range	**10 - 30 VDC**
Max. Load per Output	**1 Amp**
Max. Load per Module	**8 Amps**
Max. Inrush Current	**5 Amps (for 100 mS)**

Wiring

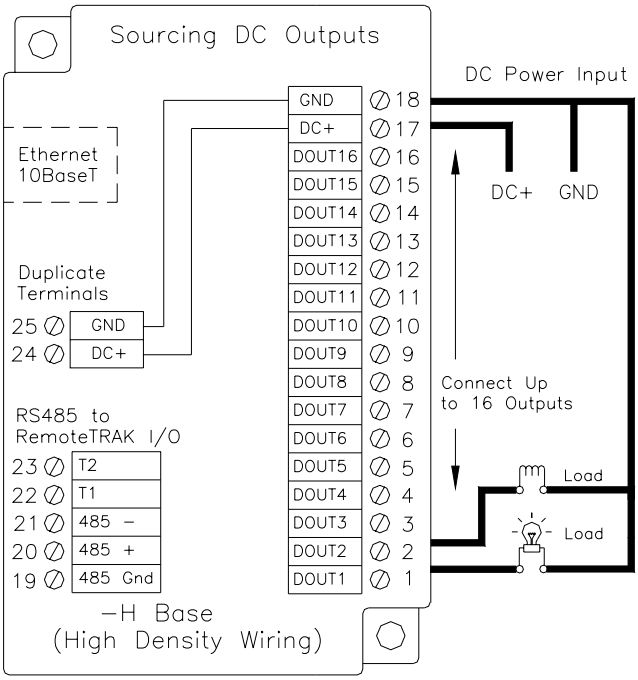
A single terminal is provided for each output channel. All outputs are powered from the DC power terminal. All channels are referenced to a common return, which is connected to the negative side (ground) of the DC power source.

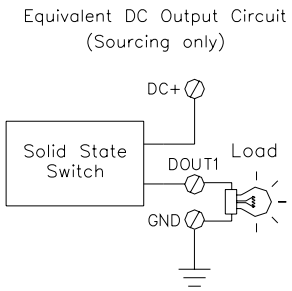
TPO Feature

Time proportioned outputs pulse ON and OFF with a duty cycle proportional to an analog value stored in an analog output register. TPO outputs are a low cost way to get smooth proportional control of heaters and other process variables. Typically, TPO analog output registers are assigned to the output of PID or other control logic in an ISaGRAF or other program. Use the SIXNET I/O Tool Kit to set pulse cycling as fast as 10 mS or as slow (many minutes) as your system dynamics require. Each output may be configured as a TPO or ordinary discrete output.

I/O Registers

Function	SIXNET Registers	Modbus Registers
Discrete Outputs	Y0 – Y15	00001 – 00016
TPO Values	AY0 – AY15	40001 – 40016





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Section 8 Discrete / Analog Modules

ET-8DI2-8AI2-H 8 Discrete Inputs and 8 4-20 mA Inputs

ET-8DI2-8AI2 Overview

Eight 4-20 mA inputs provide 14 bit analog measurements. Discrete inputs may be wired as all sourcing or sinking. An input count feature uses analog input registers to accumulate the positive transitions of each input. More information on this and other features can be found in the on-line help supplied with the SIXNET I/O Tool Kit program.

Number of Channels	**8 analog inputs (14 bit resolution), 8 discrete inputs**
Input Range	**4 - 20 mA (analog), 12/24 VDC/VAC (discrete)**
Analog Input Impedance	**100 ohms Note:** input voltage drop = 2 volts at 20 mA
Discrete Input Voltage Range	**12/24 VDC/VAC**
Input Current @ 24 VDC	**6.7 mA**

Wiring and Jumpers

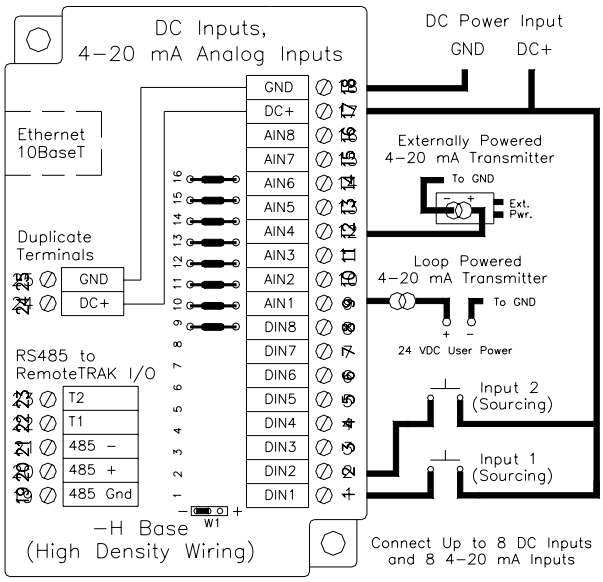
Positive DC or AC voltage must be applied to an input to indicate an ON condition. All channels are referenced to a common return or supply, which is connected to the negative side (ground) or positive side (DC+) of the DC power source. One wire from each sourcing field input should be bussed together and connected to terminal 17 (DC +). One wire from each sinking field input should be bussed together and connected to terminal 18 (DC GND). Refer to the wiring diagram below. Set jumper W1 to match the wiring configuration of the discrete inputs. A single input terminal is provided for each analog input channel. Care must be taken to externally provide a suitable instrumentation ground for these single ended input circuits.

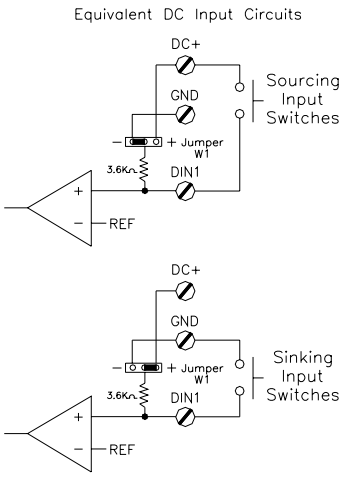
Current Shunts

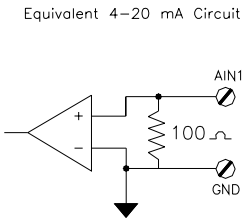
Precision 100 ohm current shunts, beneath the hinged access door in the wiring base, pass current and maintain loop integrity even if the module is unplugged. A spare shunt is provided and may be simply inserted in place of any shunt that open circuits as a result of a current overload.

I/O Registers

Function	SIXNET Registers	Modbus Registers
Analog Inputs	AX0 – AX7	30001 – 30008
Discrete Inputs	X0 – X7	10001 – 10008
Counter Inputs	AX8 – AX15	30009 – 30016







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ET-4RTD-4DI2-U 4 RTD Inputs and 4 Discrete Inputs

ET-4RTD-4DI2 Overview

Four RTD inputs provide 16 bit high resolution analog measurements. Discrete inputs may be wired as all sourcing or sinking. An input count feature uses analog input registers to accumulate the positive transitions of each input. More information on this and other features can be found in the on-line help supplied with the SIXNET I/O Tool Kit program.

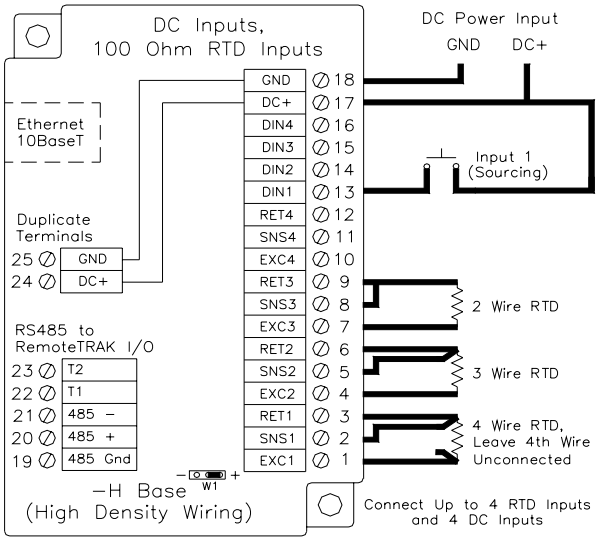
Number of Channels	**4 RTD inputs (16 bit resolution), 4 discrete inputs**
RTD Input Type / Range	**100 ohm platinum, -200 to 850 °C**
Discrete Input Range	**12/24 VDC/VAC**
Input Current @ 24 VDC	**6.7 mA**

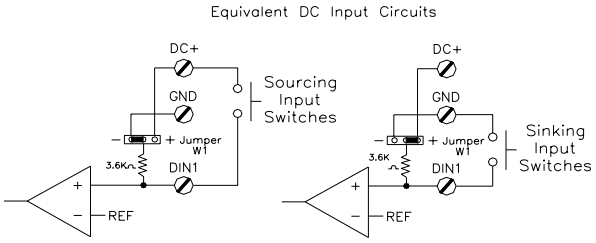
Wiring and Jumpers

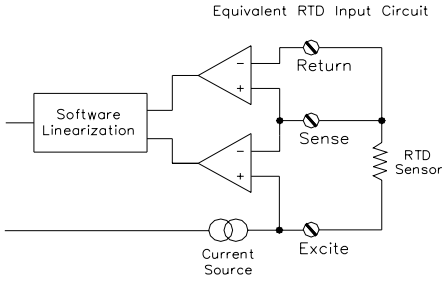
See the wiring diagram below for RTD inputs. Discrete inputs need positive DC or AC voltage applied to an input to indicate an ON condition. All channels are referenced to a common return or supply, which is connected to the negative side (ground) or positive side (DC+) of the DC power source. One wire from each sourcing field input should be bussed together and connected to terminal 17 (DC +). One wire from each sinking field input should be bussed together and connected to terminal 18 (DC GND). Refer to the wiring diagram below. Set jumper W1 to match the wiring configuration of the discrete inputs

I/O Registers

Function	SIXNET Registers	Modbus Registers
RTD Inputs	AX0 – AX3	30001 – 30004
Discrete Inputs	X0 – X3	10001 – 10004
Counter Inputs	AX4 – AX7	30005 – 30008







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ET-MIX24880 24 Discrete Ins, 8 Discrete Outs and 8 Analog Ins

ET- MIX24880 Overview

There are twenty four discrete inputs and/or eight discrete outputs (24 discrete I/O total), and eight analog inputs in this combination I/O module.

Number of Channels	**24 Discrete Ins and/or 8 discrete Outs & 8 Analog Ins**
Analog Input Range	**4 – 20 mA**
Analog Input Impedance	**100 ohms** **Note:** input voltage drop = 2 volts at 20 mA
Discrete Input Range	**10 – 30 VDC**
Discrete Output Voltage Range	**10 – 30 VDC**
Max Output current	**1A per channel, 8A per module**

Discrete Input and Output Wiring

The discrete inputs are divided into three groups of eight. Each of these three groups offers different capabilities to accommodate a variety of system requirements. A description of each of these I/O groups is given below. Refer to the Wiring Diagram for further details. The discrete input channels accept 10 to 30 volts DC. The discrete outputs source 10-30 volts DC to each load. All outputs return to common ground (terminal 18).

First Group of Eight Discrete Inputs

The first eight inputs may be configured as sourcing inputs (ON when positive voltage is applied) or sinking inputs (switch closures to ground). There is a selection jumper in the module's base that is easily accessed by unplugging the logic module and opening the hinged door. Select the desired mode – the factory default and most common setting is sourcing inputs. It is also necessary to make a similar selection in the Discrete Options window in the I/O tool Kit software. The module's firmware performs a consistency check to verify that the hardware and software selections match.

Adjustable Threshold Voltage

The first group of eight inputs may also be modified to transition at a threshold voltage lower than the factory setting. This is accomplished by soldering a resistor into the base at the indicated location, according to the following chart. Please note that this resistor is only creating a reference voltage and therefore only needs to be rated for 1/8 Watt or less:

For this range:	Install this resistor:
9 volts	standard range – no additional resistor required
7 volts	9.3K
5 volts	2.4K
3 volts	1.1K

Desired ON Voltage	Hysteresis – channel 1 & 2 only (High speed counter)		Base Resistor value	Equivalent paralleled value
	Actual ON	Actual OFF		
9 (Default)	-	-	None	3.65K
7	5.3	4.2	9.3K	2.62K
5	3.3	2.1	2.4K	1.42K
3	2.0	0.8	1.1K	845 ohms

Discrete Input Counter Feature

The first eight discrete input channels each have an input count accumulator feature. If this feature is enabled (in the I/O Tool Kit program), an analog input register will report a unipolar (unsigned) 16-bit count value (0 - 65535) that increments on each OFF to ON transition of the corresponding input. All channels are capable of a maximum count input rate of 100 Hz (6000 pulses/min). All these counters initialize at zero each time power is cycled. They cannot be reset under software control. Typically, retention of the values and resetting the counts is accomplished in software at the host computer that polls these inputs. The following modes are available.

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Up Count	Count of OFF to ON transitions of the corresponding input
Run Time Sec	Accumulated time (seconds) that the input has been in an ON state
Run Time Min	Accumulated time (Minutes) that the input has been in an ON state
Seconds to 1 Minute	Pulse Rate mode. Reports the number of pulses accumulated during the selected interval (from 0.1 second up to one minute).

High Speed Counters

The first two channels may be configured as high speed counters to record pulses as fast as 50 KHz. In this high-speed mode, the input filtering is not active, and even short input spikes will most likely be counted. Only select this option if (1) quick or frequent pulses need to be counted, and (2) the incoming pulse signal is free from noise.

Second Group of Eight Discrete Ins

The second group of eight inputs is fixed as sourcing inputs (turn ON when a positive voltage is applied) with the standard 10 – 30 volt input range.

Slow / Fast Response for All Discrete Inputs

In the I/O Tool Kit software, select "fast response" to use minimal input filtering. DC input changes as fast as 5 mS will be detected. Selecting the "Slow response" setting will tell the module to look for stable inputs for approximately 25 mS. This setting will filter contact bounce, which often happens while counting mechanical switch closures in noisy environments.

Third Group of Eight Discrete Inputs/Outputs

The third group of eight discrete I/O has both input and output capabilities at the same time. Output functionality for a given channel may be individually enabled from within in the "Feature" column of the Discrete Options configuration window. For compatibility with I/O drivers that write I/O in fixed blocks, all eight Y (output) registers are always assigned. Only outputs that are enabled may be turned ON. Other output values will be masked in the I/O module.

Outputs may also be configured to function as TPO (Time Proportioned Outputs). These outputs turn on for a duty cycle that is proportional to the value placed in a corresponding analog output register. Refer to the upcoming description for more information.

All eight channels are always active as inputs. Channels that do not have their output function enabled may be used as inputs. For channels configured as outputs, the input functionality may be used to detect faults in the corresponding outputs.

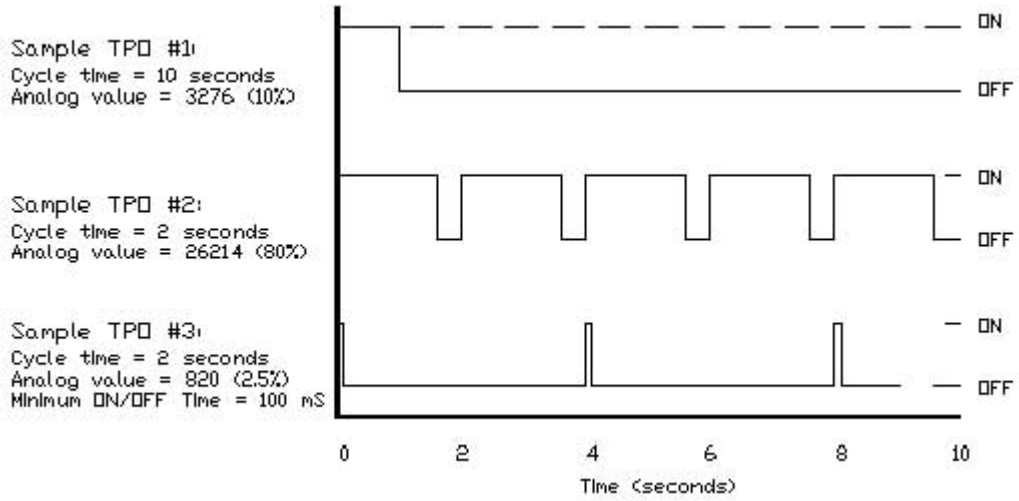
Time Proportioned Outputs (TPO)

The discrete output channels in the ET-MIX24880 are capable of time-proportioned outputs. Time proportion outputs pulse ON and OFF with a duty cycle proportional to an analog value stored in an analog output register. TPO outputs are a low cost way to get smooth proportional control of heaters and other process variables. Typically, TPO analog output registers are assigned to the output of PID or other control logic in an ISaGRAF or other program. Use the SIXNET I/O Tool Kit to set pulse cycling as fast as 10 mS or as slow (many minutes) as your system dynamics require. Each output may be configured as a TPO or ordinary discrete output.

In this example, TPO #1 has a 10 second cycle time and the analog value is 3276 (10% of full scale, which is typically 32767). The output will be ON for 1 second and OFF for 9 seconds during each 10 second period.

TPO #2 has a 2 second cycle time and the analog value is 26214 (80% of full scale). The output will be ON for 1.6 seconds and OFF for 0.4 seconds during each 2 second period.

TPO #3 has a 2 second specified cycle time, an analog value of 820 (2.5% of full scale) and a minimum ON/OFF time of 100 mS. Since the minimum cycle time is 100 mS and the calculated ON time is only 50 mS, the cycle time is readjusted by a factor of 2 to maintain the time proportion. The output will be ON for 100 mS and OFF for 3.9 seconds before repeating.



Analog Input Wiring

The analog input channels accept 4-20mA signals from a variety of devices and are protected by self-resetting current shunts to prevent shunt overheat/damage. One screw terminal is provided for each input signal. All analog inputs return to a common ground (terminal 18). Refer to the wiring diagram on the next page for more information.

LED Indication

Each analog input has an LED associated with it. The LED will be ON when there is an input signal greater than approximately 2.5 mA. Below this value the LED will be OFF.

Self-resetting 4-20 mA Input Protection

Each 4-20 mA input channel has a 100 ohm, high precision (0.1 percent) shunt across its input to develop a 2 volt signal when a full scale 20 mA input is applied. These shunts are located in the module's base, giving you the advantage of maintaining a continuous circuit even if the logic module is removed from the base. If excessive voltage is applied to an input, a self-resetting fuse will open to help prevent the shunt from overheating.

Open Loop Detection on 4 – 20 mA Analog Inputs

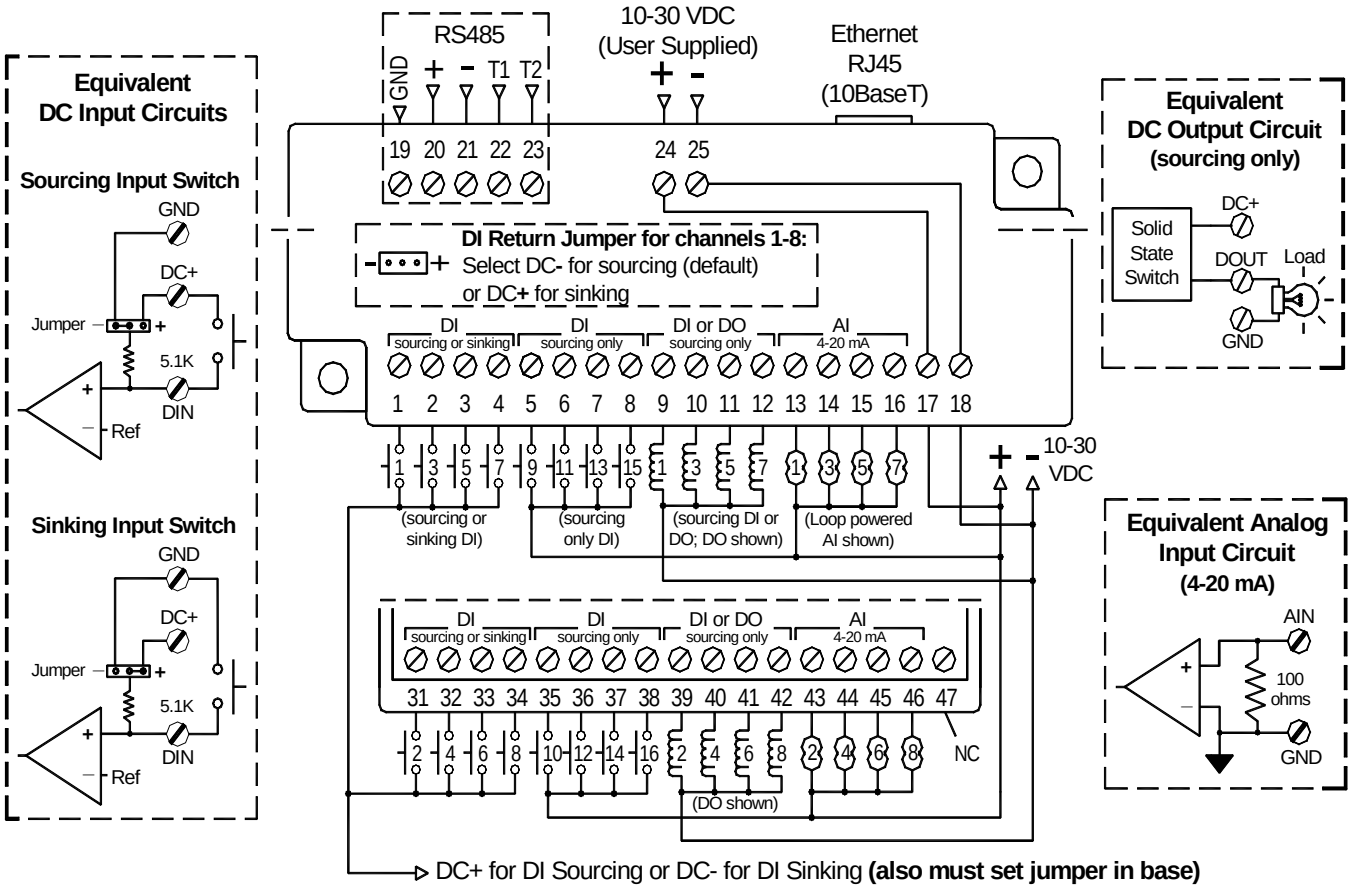
This module can detect and report an open instrumentation loop on its analog inputs. By allowing the module to report a negative value if the current falls below 4 mA, low limit logic in your DCS, PLC, RTU or computer can signal the loss of current. To enable this feature, select the "Go Negative Below 4 mA" software setting for each channel.

Reading Voltage Inputs

As an option, a voltage divider may be factory populated to replace the 20 mA (100 ohm) shunt of one or more input channels. These alterations are made in the wiring base, so they may be tailored for particular installations. (The logic modules are not altered so they remain interchangeable!) Voltage operation may be configured in the I/O Tool Kit by selecting the appropriate range for the corresponding input. Consult SIXNET for ordering instructions.

I/O Registers

Function	SIXNET Registers	Modbus Registers
Discrete Inputs	X0 – X23	10001 – 10024
Discrete Outputs	X0 – X7	00001 – 00008
Analog Inputs	AX0 – AX7	30001 – 30008
TPO	AY0 – AY7	40001 – 40008
Counter Inputs	AX8 – AX15	30009 – 30016



ET-MIX24880 I/O & Power Wiring

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Section 9 Analog Input Modules

ET-16AI2-H High Density 4-20 mA Analog Input Module

ET-16AI2 Overview

Sixteen 4-20 mA inputs provide 14 bit high resolution analog measurements. More information can be found in the on-line help supplied with the SIXNET I/O Tool Kit program.

Number of Channels	**16 (14 bit resolution)**
Input Range	**4 - 20 mA**
Input Impedance	**100 ohms** **Note:** input voltage drop = 2 volts at 20 mA

Wiring

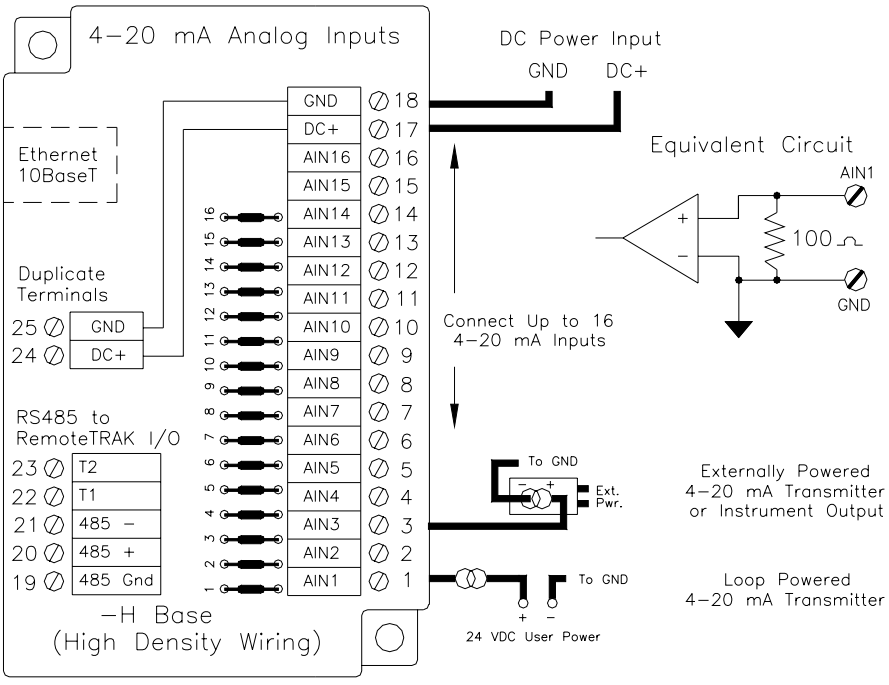
A single input terminal is provided for each measurement channel. Care must be taken to externally provide a suitable instrumentation ground for these single ended input circuits.

Current Shunts

Precision 100 ohm current shunts, beneath the hinged access door in the wiring base, pass current and maintain loop integrity even if the module is unplugged. A spare shunt is provided and may be simply inserted in place of any shunt that open-circuits as a result of a current overload.

I/O Registers

Function	SIXNET Registers	Modbus Registers
Analog Inputs	AX0 – AX15	30001 – 30016



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ET-8INS-U Instrumentation Analog Input Module

ET-8INS Overview

Eight configurable inputs provide 16 bit high resolution analog measurements. More information can be found in the on-line help supplied with the SIXNET I/O Tool Kit program.

Number of Channels	**8 (16 bit resolution)**
Input Range	**0/4 - 20 mA, 62 mV to 10V, JKERTBCNS thermocouples**
Input Impedance (current)	**100 ohms** **Note:** input voltage drop = 2 volts at 20 mA
Input Impedance (other ranges)	**200K Ohms**

ET-8INS Wiring

Two input terminals are provided for each measurement channel. Channel to channel isolation is provided.

4-20 mA Input Jumpers

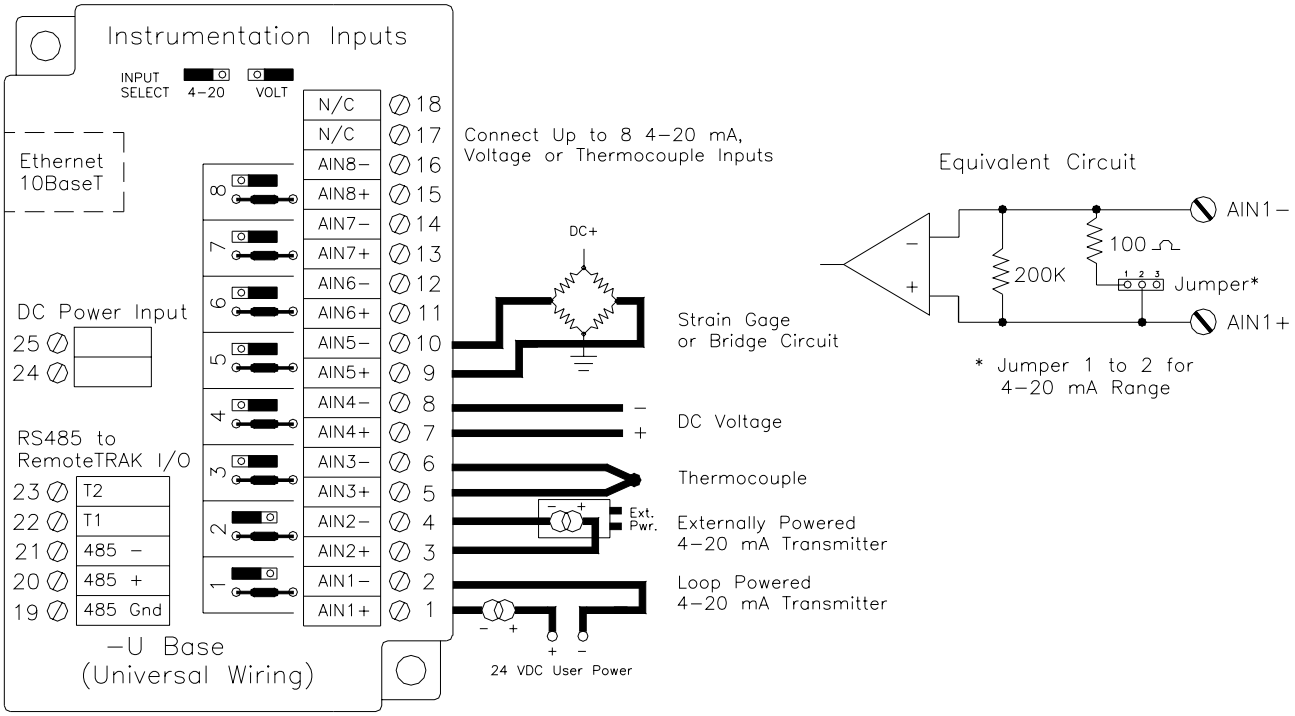
This module has a 4-20 mA input enable jumper for each channel. Set each jumper to match the desired input as shown in the diagram below. The jumper setting must match the range selection in the SIXNET I/O Tool Kit.

Current Shunts

Precision 100 ohm current shunts, beneath the hinged access door in the wiring base, pass current and maintain loop integrity even if the module is unplugged. A spare shunt is provided and may be simply inserted in place of any shunt that open-circuits as a result of a current overload.

I/O Registers

Function	SIXNET Registers	Modbus Registers
Analog Inputs	AX0 – AX7	30001 – 30008



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Section 10 Analog I/O Module

ET-8AI2-4AO2-H Combined Analog Input and Output Module

ET-8AI2-4AO2 Overview

This module combines eight 4-20 mA analog inputs and four 4-20 mA outputs. More information can be found in the on-line help supplied with the SIXNET I/O Tool Kit program.

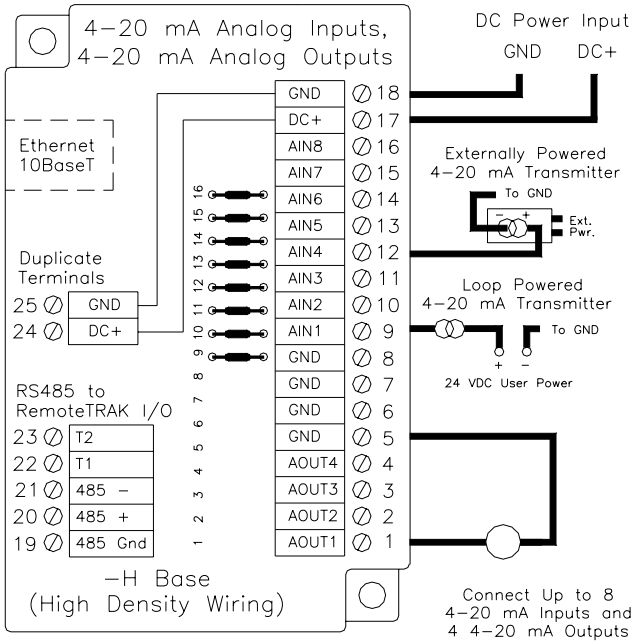
Number of Analog Inputs	**8 (14 bit resolution)**
Input Range	**4 - 20 mA**
Input Impedance	**100 ohms** **Note:** input voltage drop = 2 volts at 20 mA
Number of Analog Outputs	**4 (16 bit resolution)**
Output Range	**4 - 20 mA**

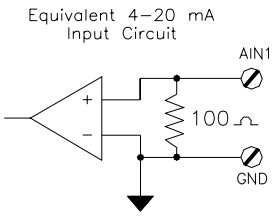
Wiring

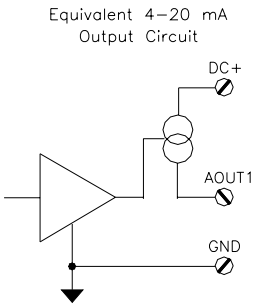
A single input terminal is provided for each input and output channel. Care must be taken to externally provide a suitable instrumentation ground for these input and output circuits.

I/O Registers

Function	SIXNET Registers	Modbus Registers
Analog Inputs	AX0 – AX7	30001 – 30008
Analog Outputs	AY0 – AY3	40001 – 40004







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Section 11 Service Information

Service Information

We sincerely hope that you never experience a problem with any SIXNET product. If you do need service, call SIXNET at (518) 877-5173 and ask for Applications Engineering. A trained specialist will help you to quickly determine the source of the problem. Many problems are easily resolved with a single phone call. If it is necessary to return a unit to us, an RMA (Return Material Authorization) number will be given to you.

SIXNET tracks the flow of returned material with our RMA system to ensure speedy service. You must include this RMA number on the outside of the box so that your return can be processed immediately.

The applications engineer you are speaking with will fill out an RMA request for you. If the unit has a serial number, we will not need detailed financial information. Otherwise, be sure to have your original purchase order number and date purchased available.

We suggest that you give us a repair purchase order number in case the repair is not covered under our warranty. You will not be billed if the repair is covered under warranty.

Please supply us with as many details about the problem as you can. The information you supply will be written on the RMA form and supplied to the repair department before your unit arrives. This helps us to provide you with the best service, in the fastest manner. Normally, repairs are completed in two days. Sometimes difficult problems take a little longer to solve.

If you need a quicker turnaround, ship the unit to us by air freight. We give priority service to equipment that arrives by overnight delivery. Many repairs received by mid-morning (typical overnight delivery) can be finished the same day and returned immediately.

We apologize for any inconvenience that the need for repair may cause you. We hope that our rapid service meets your needs. If you have any suggestions to help us improve our service, please give us a call. We appreciate your ideas and will respond to them.

For Your Convenience:
Please fill in the following and keep this manual with your SIXNET system for future reference:

P.O. #:_____ Date Purchased: _____

Purchased From:_____

Product Support

To obtain support for SIXNET products, call SIXNET and ask for applications engineering. Our phone numbers are:

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